dCS Verona

Master Clock

User Manual

Software Release 1.1x

August 2005

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[1] ***dCS*** is Data Conversion Systems Ltd. Company registered in England No. 2072115.

PRODUCT OVERVIEW

The ***dCS Verona*** is a consumer version of the ***dCS 992*** and ***995*** professional Master Clocks.

The ***Verona*** generates very stable clocks at either 44.1 or 48kHz, accurate to better than 1 part per million. The usual application is synchronising the units in SACD / CD systems, where a 44.1kHz Word Clock is used throughout. The improved synchronisation and stability offered by the ***Verona*** enhances the sound quality, extracting more depth and detail from high quality recordings.

Most customers use the ***Verona*** with a set of ***dCS*** equipment, however the ***Verona*** may be used with any transport or other digital source that will accept a 44.1 or 48kHz reference clock in either Word Clock or SPDIF clock formats.

Verona features an External Reference Input, allowing the Master Clock to be slaved to a even more accurate reference, such as a GPS receiver or an atomic clock, if desired. The ***Verona*** will convert a variety of audio sample rates or standard frequencies to either of the two clock frequencies, cleaning the reference signals in the process.

In common with all ***dCS*** converters, the ***Verona*** is based on our flexible digital audio platform which makes extensive use of software configurable chips – FPGA's and DSP's. This allows the internal software to be updated from time to time, either from a ***dCS*** CD or from a PC, adding extra features and facilities to your system with a minimum of fuss.

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About this Manual

If you have not used a ***Verona*** before, please read the section "Using your ***dCS Verona*** for the first time" on page **30**.

This manual has been arranged with the most commonly used sections placed first:

- table of contents (page **4**)
- step-by-step (page **8**) and applications guides (page **10**)
- detailed software and hardware information (page **14**)
- technical information (page **26**)
- information for first time users (page **30**)
- options, maintenance and troubleshooting (page **32**)
- index section (page **42**)

What does the coloured text mean?

If you are reading a colour print or a soft copy of this manual, you will notice that some types of text are in colour:

- **Brown text in bold** is a reference to another section or page. Sometimes, if you are reading a soft copy of the manual, page numbers are hyperlinks – click on them and you will go there.
- **Blue text** is used for controls and connectors, described in the hardware section.
- **White text in bold on black** is used for alternative control functions, such as menu operation.
- Pink text is a menu page or setting.
- **Green text in bold** shows what appears on the display.
- **Purple text in bold** is used for indicators.

IMPORTANT! *Important information is presented like this - ignoring this may cause you to damage the unit, or invalidate the warranty.*

The manual is designed to be helpful. If there are points you feel we could cover better, or that we have missed out - please tell us.

About Sample Rates

All references to sample rates in this manual use the unit kS/s (kilo Samples per second) rather than the technically incorrect kHz.

STEP-BY-STEP GUIDE

This section guides you through setting up the unit for basic operation. You may find this useful if you have not used the ***Verona*** for a while.

Preliminaries

The **Control Summary** sheet details the menu structure and outlines the use of the front panel controls. For more information, see the Menu section on page **14**.

For digital interfaces, use with cables designed for digital audio:

- for Word Clock interfaces, use 75Ω coax cables fitted with BNC plugs.
- for SPDIF RCA interfaces, use 75Ω coax cables fitted with RCA Phono plugs.

do this: Connect the power cable supplied to the Power inlet on the ***Verona*** rear panel, plug the other end into a convenient power outlet. Set the power switch beside the power inlet to the on position (I).

IMPORTANT! *Please do not use an excessively thick power cable as this may damage the power inlet connector. Such damage is not covered by the warranty.*

do this: Press the **Power** button and wait about 5 seconds while ***Verona*** configures itself.

The display will show in sequence: **Verona**, **Testing** and either **44.1kHz** or **48kHz.**

If the unit is likely to be set in an unfamiliar state, you can reset it as follows:

do this: Press the **Menu** button once, then press the **Step Back** button so the display shows Factory. Press the **Select** button and wait a second.

The unit will display **Defaults**. The **PWR** indicator and perhaps the **OK** indicator will be lit, the others should be off.

Connecting the System for DSD

Most owners will use the ***Verona*** to clock other ***dCS*** equipment at 44.1kHz.

do this: If necessary, use the **Clock Frequency** button to set the outputs to **44.1kHz**.

do this: Connect one of the ***Verona***'s **Word Clock Outputs** to the Word Clock input of each unit in the chain – the transport, the DSD upsampler and the DAC. The five outputs are the same.

do this: Connect a 1394 cable from the ***Verdi*** to the DAC and from the ***Purcell*** to the DAC. Connect an AES cable from the ***Verdi*** to the ***Purcell***'s AES input.

IMPORTANT! *It is essential to lock the transport to the **Verona**. If this is not done, the source will not be synchronised to the rest of the system, causing locking problems or regular clicks.*

A ***Verdi*** or ***La Scala*** will slave to the ***Verona*** automatically, the **WClk** indicator will light to confirm this.

do this: For ***Purcell*** (v2.00 or later), select the required input then set the WClk menu page to WClk: In. The **WClk** indicator will light to confirm that the upsampler is locked. Set the **Output** to **DSD**.

do this: For ***Elgar Plus*** or ***Delius***, select the **1394** input then set the MS menu page to MS: Sync. The **SDIF** indicator (***Elgar***) or **WClk** indicator (***Delius***) will light to confirm that the DAC is locked.

See the "Typical Applications" section on page **10** for more details.

Connecting the System for Dual AES

For owners who prefer to use Dual AES it is important to choose compatible sample rates. The Dual AES sample rate MUST be exactly 2 or 4 times the source sample rate and clock frequency.

do this: If necessary, use the **Clock Frequency** button to set the outputs to **44.1kHz**.

do this: Connect one of the ***Verona***'s **Word Clock Outputs** to the Word Clock input of each unit in the chain – the transport, the DSD upsampler and the DAC. The five outputs are the same.

IMPORTANT! *It is essential to lock the transport to the **Verona**. If this is not done, the source will not be synchronised to the rest of the system, causing locking problems or regular clicks.*

do this: Connect a 1394 cable from the ***Verdi*** to the DAC. Connect an AES cable from the ***Verdi*** to the ***Purcell***'s AES input. Connect 2 AES cables from ***Purcell***'s AES outputs to the DAC's AES inputs.

A ***Verdi*** or ***La Scala*** will slave to the ***Verona*** automatically, the **WClk** indicator will light to confirm this.

do this: For ***Purcell*** (v2.00 or later), select the required input then set the WClk menu page to WClk: In. The **WClk** indicator will light to confirm that the upsampler is locked. Set the **Output** to **88.2 kS/s Dual AES** or **176kS/s Dual AES**.

do this: For ***Elgar Plus*** (v4.30 or later) or ***Delius*** (v2.30 or later), select the **Dual AES** input then set the MS menu page to MS: Sync. The **SDIF** indicator (***Elgar***) or **WClk** indicator (***Delius***) will light to confirm that the DAC is locked.

If the source sample rate is 48kS/s or 96kS/s and has a Word Clock input, set ***Verona*** to **48kHz** and set ***Purcell*** to upsample to **96** or **192kS/s**.

TYPICAL APPLICATIONS

Using a *Verona* with an upsampling transport

This is the simplest disc-only system using the ***Verona***. The ***La Scala*** outputs DSD data whether you play SACDs or ordinary CDs.

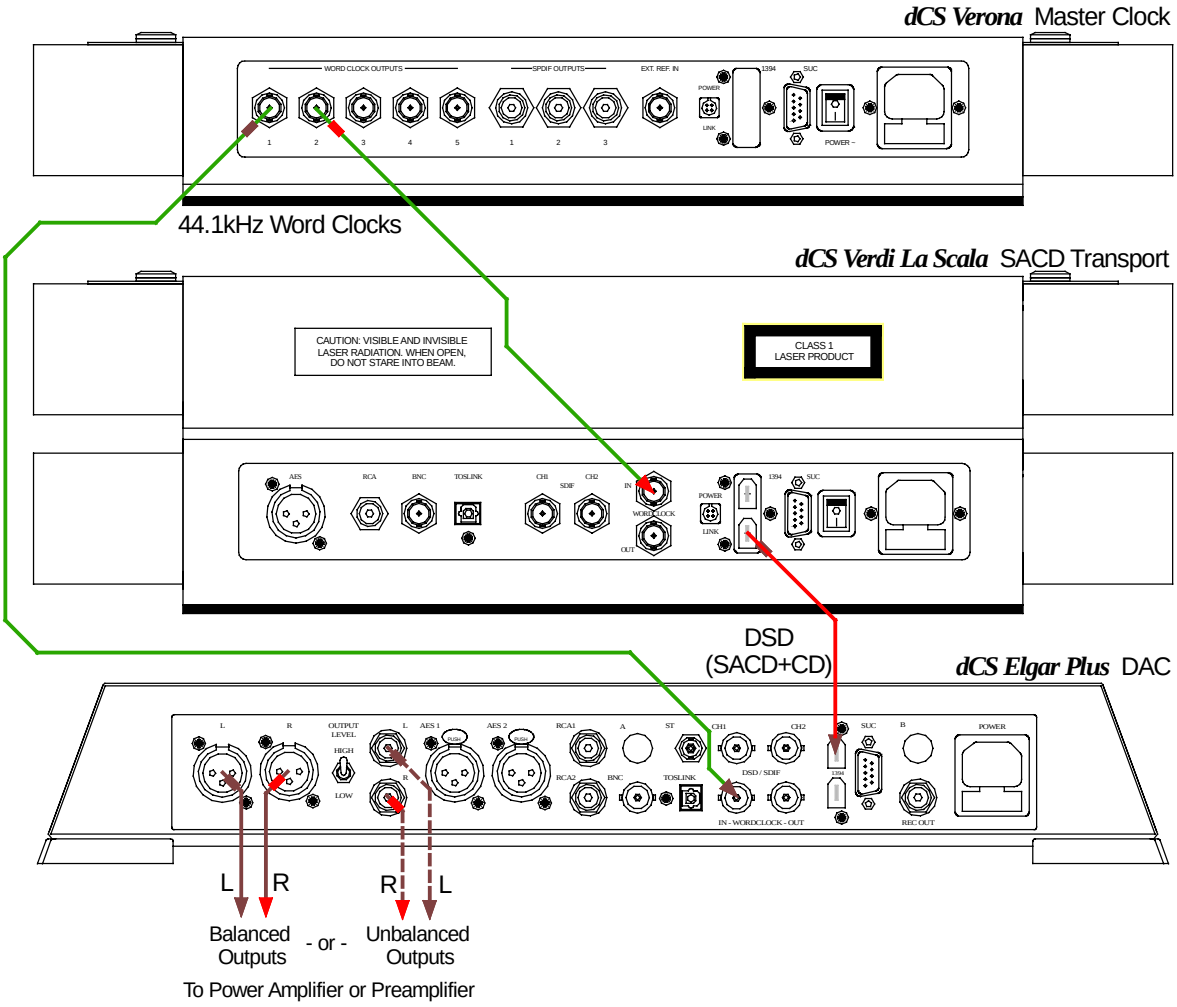

Figure 1 – Using ***Verona*** to clock a ***La Scala*** and an ***Elgar Plus***

do this: Connect up as shown in **Figure 1**.

do this: The first time you use this arrangement, open the menu and run the Factory routine on all three units. This sets the ***Verona*** to 44.1kHz.

do this: If necessary, use the **Input** button on the ***Elgar Plus*** to select the **1394** input. Open the ***Elgar***'s menu and set the MS page to MS:Sync.

It is as simple as that.

Using a *Verona* with a DSD upsampler

If you have a ***Verdi*** rather than a ***La Scala***, you can still upsample your CDs to DSD by adding a 1394-equipped ***Purcell*** to the system.

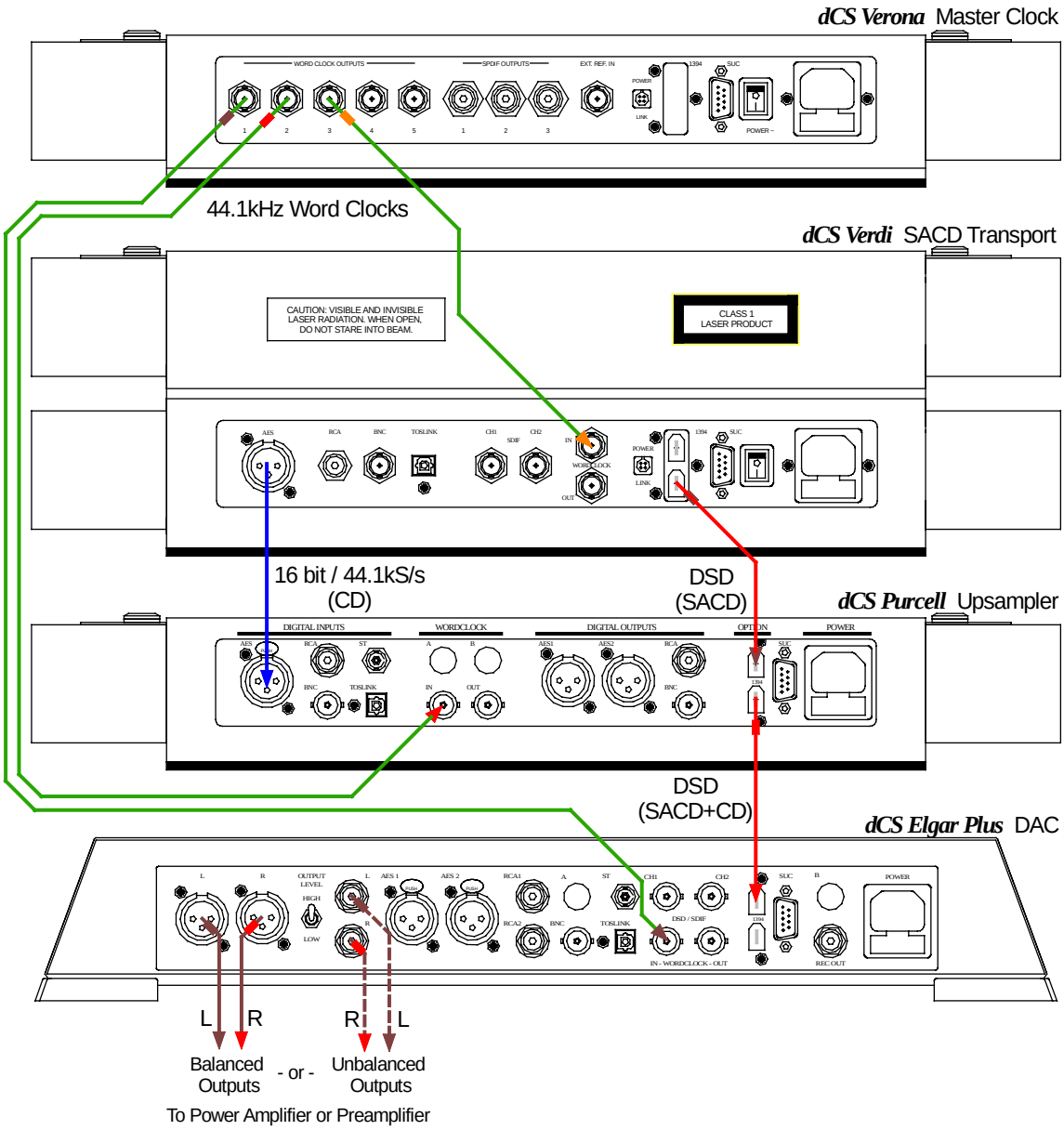

Figure 2 - Using ***Verona*** to clock a ***Verdi,*** a ***Purcell*** and an ***Elgar Plus***

do this: Connect up as shown in **Figure 2**.

do this: The first time you use this arrangement, open the menu and run the Factory routine on all four units. This sets the ***Verona*** to 44.1kHz.

do this: If you prefer, you can connect one of the ***Purcell***'s other inputs to the ***Verdi*** instead of using the **AES** input. Select that input using the ***Purcell***'s **Input** button.

do this: Open the ***Purcell***'s menu and set the WClk page to WClk:In. The ***Purcell*** will lock to the ***Verona***.

do this: If necessary, use the **Input** button on the ***Elgar Plus*** to select the **1394** input. Open the ***Elgar***'s menu and set the MS page to MS:Sync.

Using a *Verona* with a GPS clock

If you have a GPS clock or atomic clock, you can slave the ***Verona*** to the clock, improving the accuracy of the ***Verona*** to that of the clock.

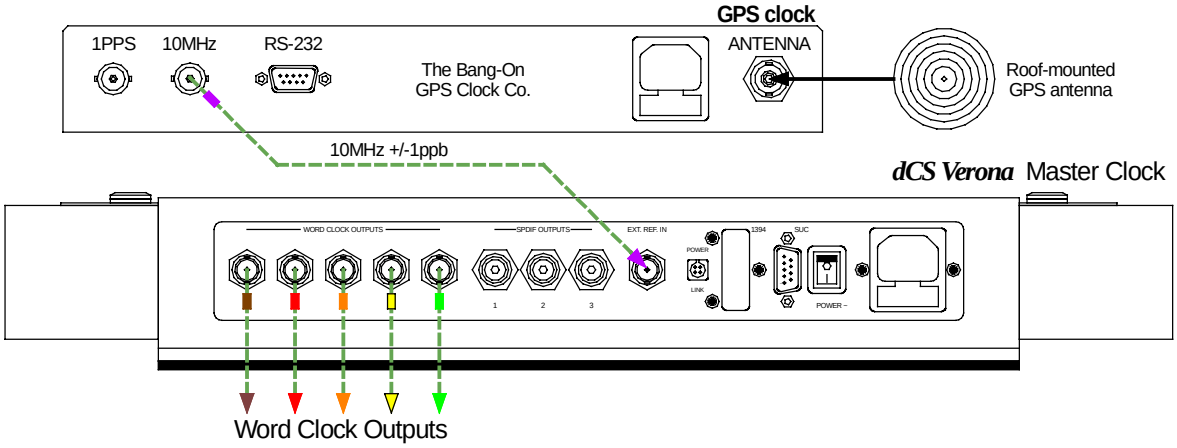

Figure 3 – Slaving the ***Verona*** to a GPS clock

do this: Connect up as shown in **Figure 3**.

do this: The first time you use this arrangement, open the menu and run the Factory routine on all four units. This sets the ***Verona*** to 44.1kHz.

do this: Open the menu and set the Couple page to Bipolar.

The ***Verona*** will lock to the clock. All the outputs will be at 44.1kHz, at the accuracy of the clock.

do this: If you need 48kHz, press the **Clock Frequency** button.

do this: Use the ***Verona***'s outputs to synchronise the audio equipment together.

Note that a GPS clock relies on receiving a satellite transmission. Any gaps in GPS satellite coverage will result in the frequency accuracy of the outputs reverting to that of the ***Verona*** – which is quite adequate for audio use.

THE SOFTWARE – THE MENU

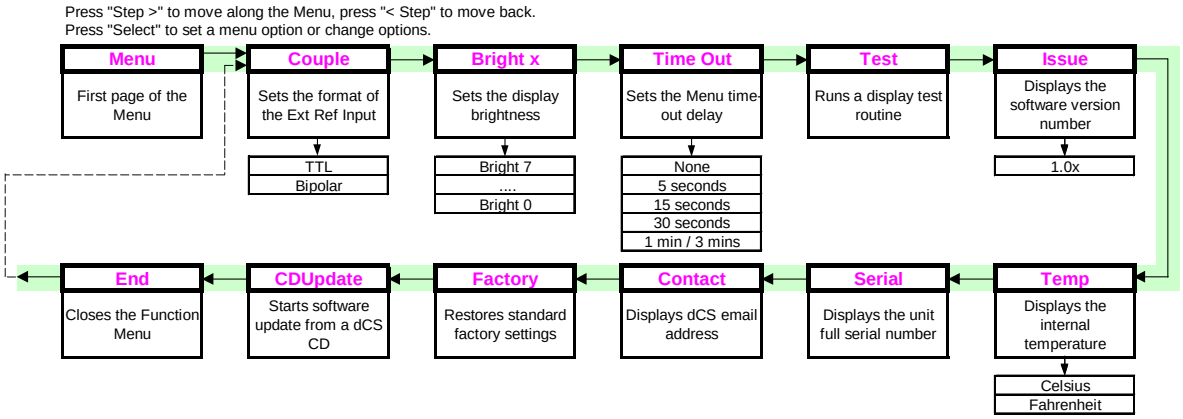

Figure 4 – Menu flow chart

Using the Menu

The Menu gives the user access to a wide range of additional features. It also allows new features and performance enhancements to be added at a later date by software upgrades.

Opening the Menu

The Menu is controlled by three buttons:

- the **Menu** button opens the menu and doubles as the **Select** button.
- the **Step** → button pages forward through the Menu – the **Step** button.
- the ← **Step** button pages backward through the Menu – the **Step Back** button.

When you first open the Menu, the display will show **Menu**.

Successive presses of the **Step** button page through the Menu. You cannot go directly to any particular page, but must enter at the top of the Menu and then page through until you reach the page you want.

Types of Menu Page

There are three types of page in the Menu - Parameter Pages, Information Pages and Test Pages.

Parameter pages allow the user to check and also change the current settings of the operating parameters, for example Bright. When a parameter page is displayed, the first press of the **Select** button shows the current setting. Subsequent presses of the **Select** button change the page setting.

Information pages display information about the unit, for example Software Issue. When an information page is displayed, pressing the **Select** button displays the information held on that page.

Test pages allow the user to initiate a number of useful routines, for example Test. When a Test page is displayed, pressing the **Select** button starts the test routine.

Closing the Menu

There are two ways to close the menu and return to normal operation. The easiest way is to wait 5 seconds for the unit to time-out and revert to the standard display. Alternatively, use the **Step** button to page forward until the display shows **End** and then press the **Select** button once.

If the unit times out before the operation in hand has been completed, simply re-enter the menu, page forward (or backward) and continue where you left off. If you find the 5 second time-out difficult to use, you can extend it by changing the TimeOut setting.

Menu Sequence

Use the flow chart (**Figure 4**) or the **Control Summary** sheet to guide you through the Menu more quickly.

The following explanation deals with the Menu pages in the sequence they occur in the Menu[2]. The use of each page is shown on an individual basis, with the last operation being closing the Menu. After you have become more familiar with the Menu, you will find it more convenient to perform all the Menu operations in one go before finally closing the Menu.

Couple – Setting the format of the Ext Ref Input

When the **Ext**ernal **Ref**erence **In**put is in use, the input characteristics must be set to match the source. There are two options:

TTL	The input accepts a DC coupled clock at TTL levels. This is the usual setting for Word Clock references.
Bipolar	The input accepts a DC or AC coupled clock, which has an even voltage swing about ground. This is the usual setting for GPS references.

do this: Open the Menu and step through until the display shows Couple.
do this: Press the **Select** button to flip between TTL and Bipolar.
do this: When you have the option you want, wait for the Menu to time-out and the display to revert to its normal mode.

IMPORTANT! *The **Ext Ref In**put will not operate if this menu is set to TTL and an AC coupled cable used.*

Bright x - Display Brightness

This adjusts the brightness of the main display, with settings between 7 (brightest) and 0 (off, unless something is touched).

do this: Open the Menu and step through until the display shows **Bright x**, where x is a number between 7 and 0.
do this: Press the **Select** button repeatedly and the display cycles through Bright 7, Bright 6, ..., Bright 1, Bright 0 and back to Bright 7.

After time-out, a setting of Bright 0 blanks the display unless the unit is not locked. Operating any control or locking to a source while in this mode turns the display back on momentarily.

TimeOut – Menu Time Out Setting

If you find the 5 second time out period for the menu is too short, use this option to change the time out period.

do this: Open the Menu and step through until the display shows **Timeout**.
do this: Press the **Select** button repeatedly and the display will cycle through the options: None, 5 secs, 15 secs, 30 secs, 1 min, 3 mins.

When set to None, the menu does not close automatically. Close it manually by stepping through to the End page and pressing **Select**.

do this: Choose the setting you want and press the **Select** button again.

[2] A minor software update may change the order of the menu items or add an option. If this happens, the Control Summary sheet may be updated before the manual.

Test - Display Test

This runs a test routine to ensure the display is working correctly.

do this: Open the Menu and step through until the display shows **Test**.
do this: Press the **Select** button once to start the test.

- The main display lights up then fades from bottom to top.
- The indicator LEDs light up briefly in sequence.
- All indicators light up, along with small squares on the main display. This flashes off and on once.
- The display shows **Done**.

Issue – Software Issue State

This displays the issue number of the software fitted to your unit. You will need to check this if you are considering a software upgrade or if your unit malfunctions.

do this: Open the Menu and step through until the display shows **Issue**.
do this: Press the **Select** button once to display the software issue.
do this: For units fitted with a **1394** interface, press the **Select** button again to display the 1394 interface software issue.

Temp – Unit Internal Temperature

This displays the temperature inside the unit, close to the crystal oscillators.

do this: Open the Menu and page through until the display shows **Temp**.
do this: Press the **Select** button once to display the temperature in degrees Fahrenheit. Press **Select** again to change to degrees Celsius.

Serial – Unit Serial Number

This displays the full serial number, including the hardware configuration code. We will need this information to assemble upgraded software to suit your unit.

do this: Have a pen and paper handy to note down the number. Open the Menu and step through until the display shows **Serial**.
do this: Press the **Select** button once and the serial number will scroll across the display.

Contact - Contact information

This displays ***dCS'*** email address and web-site URL.

do this: Open the Menu and step through until the display shows **Contact**.
do this: Press the **Select** button once and the contact information will scroll across the display.

CDUpdate – Software Update By CD

Current software for ***dCS Elgar Plus***, ***Elgar***, ***Delius*** or ***Purcell*** and all ***Verdi, La Scala*** or ***Verona*** software features a CD Update menu page. You can update the software inside any of these products loaded with CD Update software quickly and easily from a CD supplied by ***dCS.***

IMPORTANT! *Please follow the latest update instructions supplied with the CD. The following is for guidance only.*

You will need a standard CD Transport, a CD player or a ***dCS Verdi*** to play the CD. A few CD players are not suitable because they upsample to 48kS/s or change some of the data bits in other ways (one example is the ML37). Don't worry - the CD Update routine detects these and stops, preventing any changes to the internal software.

If you are updating a ***dCS*** Upsampler or DAC:

do this: Connect an AES or RCA digital output from the Transport to the Upsampler or DAC and select the input you have just connected. Disconnect any **1394** interface cables.

If you are updating a ***dCS*** DAC connected to the Transport through another device:

do this: Connect an AES or RCA digital output from the other device to the DAC and select the input you have just connected. Set the other device to bit-for-bit mode (Cloning on a ***dCS*** Upsampler). Disconnect any **1394** interface cables.
If in doubt, connect the DAC directly to the transport.

If you are updating a ***dCS Verona***:

do this: Disconnect ALL cables from the unit, except the power cable. Open the Menu on the unit to be updated and step through until the display shows **CDUpdate**.
do this: Make sure the transport is in **STOP** mode.
do this: Press the **Select** button to start the routine.
do this: When the unit displays **Cable**, connect a BNC cable from the **Ext Ref In**put to a BNC SPDIF digital output on the transport. The unit will lock to the transport, then display **Wait**.

If you are updating a ***dCS*** Transport, the Transport plays the CD and updates itself, missing out some of the early steps. Disconnect any **1394** interface cables.

For all ***dCS*** units:

do this: **RELAX!** The update procedure is easy.
do this: Mute your power amplifier.
do this: Insert a ***dCS*** CD (containing software for the unit you want to update) into the transport, making sure it is in **STOP** mode.
do this: Open the Menu on the unit to be updated and step through until the display shows **CDUpdate**.
do this: Press the **Select** button to start the routine.

The unit will display **Wait** while it prepares the flash memory for the update. After 3-4 minutes, the unit will scroll **Please Start CD**.

do this: Press **PLAY**.

IMPORTANT! *Do not press* **PLAY** *before the unit to be updated is ready. This can cause the download to fail. Use only* ***dCS*** *CDs.*

The unit will now inspect the CD, and will display **Scanning**, while it reads administrative data.

If there is anything wrong with the ***dCS*** CD that has been loaded or it does not match the product, the unit will display **Wrong!** or **Wrong CD** or **No Index** and revert to normal operation. Don't worry – the internal software is unchanged. Check the CD for dust or scratches.

If it is not a ***dCS*** CD at all, the unit will keep repeating **Please Start CD**, for about 30 seconds or display **Wrong CD** and then revert to normal operation.

If the data is correct, the unit will display **Track n**, where n is a number.

do this: You can move the Transport on to track n, or wait for it to get there of its own accord.

If the unit has to wait for the right track, it will display **Found Track 1**, then **Found Track 2**, etc, until it finds the right one. **Vx.xx** will appear on the display (this is the new software issue number). If the unit displays **No Track**, repeat the procedure but manually advance the transport to track n.

Next, the update progress is displayed in one of the following formats:

- The display counts up from **0% 0/7** to **99% 0/7**, displays **Copying**, counts up from **0% 1/7** to **99% 1/7**, displays **Copying** and so on until the last section is loaded and copied. Some models may use less than 8 sections.
- A moving dot counts down slowly from about **3** to **0**.

After about 15 minutes, the update is complete and the unit will reboot itself.

do this: If the CD is still playing, you can stop it now.

do this: If the unit being updated has a 1394 interface, wait until the unit has settled (about 30 seconds), switch it off for 10 seconds, then on again.

If the unit detects no change in the 1394 interface code, it will boot up as usual and be ready for use.

If the 1394 interface code has been updated, the unit will load the new code into the flash memory on the 1394 interface board – **this takes about 10 minutes**. While this is taking place, the unit will display a progress bar. Next the unit will display in sequence: **Done 5**, **Done 4**, …, **Done 1** then reboot itself again.

The unit is ready for use.

OOPS!

If the CD transport stops or becomes disconnected during an update, don't worry! The original software is backed up inside the unit. Proceed as follows:

The checking routine will find a sequencing error and **Non Seq** or **Bad CD!** will appear on the display.

do this: Turn the power off and on to reboot. This message will scroll across the display:

Bad CheckSum – Press Function button to attempt recovery
or **Bad CheckSum – Press Mute button to attempt recovery**
or **Bad CheckSum – Press Menu button to attempt recovery,**

depending on the model.

do this: Press the appropriate button once.

The original software is retrieved from the internal backup while displaying **Wait...** . This may take a few minutes. When recovery is complete, the unit re-boots.

do this: Run the CD Update routine again to load the new software.

Factory – Restoring Factory Defaults

This feature sets most of the parameters back to the factory default settings. This can be useful if the settings are accidentally changed and you need to reset the unit to a standard configuration, or your children play with it.

do this: Open the Menu and step through until the display shows **Factory**.
do this: Press the **Select** button and leave the menu to time out.

The unit will return to normal operation set up as follows:

- **Clock Frequency** to **44.1kHz**
- **Dither** to Off
- Couple to TTL
- Display brightness to Bright 4
- Timeout to 15 secs

THE HARDWARE – CONTROLS AND CONNECTORS

Front Panel

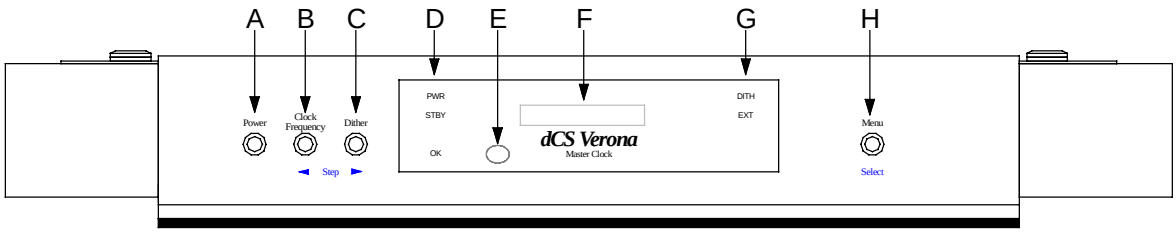

Figure 5 – *dCS Verona* Front Panel

Key to Front Panel

A	**Power** / Standby button
B	**Clock Frequency** button or Menu **Step Back** button
C	**Dither** button or Menu **Step** button
D	**Status** indicator
E	Remote Control sensor
F	**Main Display**
G	**Mode** indicator
H	**Menu** or **Select** button

Power Button

This button doubles as a power on / off switch and a standby mode switch.

do this: To switch on, press the **Power** button briefly. If power is available, the **PWR** indicator will light and ***Verona*** will run through the power up routine.

Note that the **Power** button will not click when turning power on – this is normal.

do this: When you have finished listening, press the **Power** button briefly to set the unit to standby mode.

The outputs will mute, all displays will turn off except the **PWR** and **STBY** indicators. In this mode, ***Verona*** uses less power. If power is switched off or fails, Standby mode is cancelled.

do this: To restore normal operation, press the **Power** button briefly again.

Verona will power up ready for use.

do this: To switch off completely, press the **Power** button and hold it for a few seconds until the **Main Display** shows **Power Dn**, then release it.

Clock Frequency Button (**Step Back**)

do this: Press this button to set the clock frequency to either 44.1kHz (usually for CD or SACD transports) or 48kHz (usually for DVD transports).

The **Clock Frequency** button doubles as the Menu **Step Back** button, used for paging backwards through the Menu (see page **14**).

Dither Button (Step)

do this: Press this button to turn the dither on or off. The DITH indicator lights if dither is being added.

The Dither button doubles as the Menu Step button, used for paging forwards through the Menu (see page 14).

Status Indicator

This consists of 3 indicators:

- PWR is lit when power is connected and the unit is turned on or is in standby mode.
- STBY is lit when the unit is in standby mode.
- OK lights about 30 minutes after powering up, to indicate that the crystal oscillators have fully settled. The unit is usable one minute after powering up.

Remote Control Sensor

Remote Control operation is not supported in this release.

Main Display

The main display tells you what *Verona* is doing.

In normal use, the unit displays either 44.1kHz or 48kHz.

While locking to an external reference the display shows Locking. When locked, the unit displays either 44.1kHz or 48kHz.

When accessing the Menu (see page 14), menu options are displayed here.

If an error occurs during power up or normal use, the details of the fault will be displayed. See “Fault Indication” on page 38.

Mode Indicator

The DITH indicator lights to show that dither is being added to the outputs.

The EXT indicator lights when the unit is locked to an external reference connected to the EXT REF IN connector. The external reference over-rides the internal crystal oscillators.

Menu Button (Select)

Press the Menu button to open the Menu (see page 14) and change or Select settings in the menu.

Rear Panel

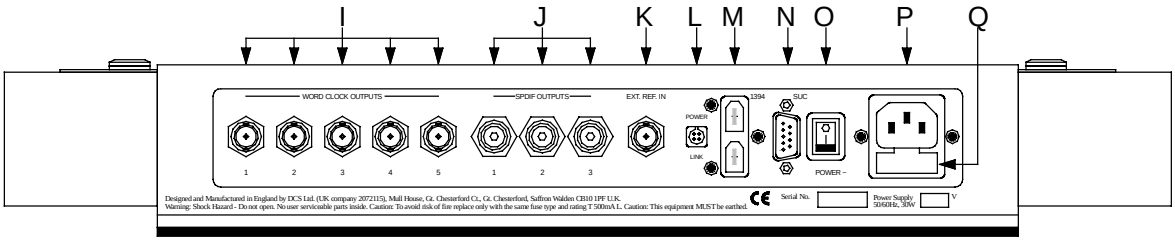

Figure 6 – ***dCS Verona*** Rear Panel

Key to Rear Panel

I	**Word Clock Outputs 1 - 5** on BNC connectors
J	**SPDIF Outputs 1 - 3** on RCA connectors
K	**Ext**ernal **Ref**erence **In**put on BNC connector
L	**Power Link** connector
M	Optional IEEE **1394** interface on two 6-way connectors
N	**S**oftware **U**pgrade **C**onnector, 9-way 'D' type
O	**Power** switch
P	IEC **Power** inlet
Q	Mains fuse holder

Word Clock Outputs 1 - 5

There are 5 identical Word Clock outputs, all on BNC sockets. They carry the same Word Clock at either 44.1 or 48kHz.

Connect up the BNC sockets with 75Ω co-axial cables designed for digital audio or RF use. A.C. coupled cables are not suitable.

SPDIF Outputs 1 – 3

There are 3 identical SPDIF outputs, all on RCA phono connectors. They carry the same SPDIF clock signals but no audio data, sampled at 44.1kS/s or 48kS/s. The format is IEC60958, otherwise known as SPDIF.

Use with 75 ohm co-axial cables designed for digital audio or RF use. Some types of audio cable are not suitable and may cause crackling noises or other malfunctions.

External Reference Input

The **Ext**ernal **Ref**erence **In**put accepts a Word Clock at the main audio frequencies or various reference frequencies (see page **26**). It allows ***Verona*** to act as a clock distribution box.

When a suitable external reference is connected, ***Verona*** will automatically slave to it. The main display will show **Locking** for several seconds, then the set clock frequency (either **44.1kHz** or **48kHz**) and the **EXT** indicator will light.

Use with 75 ohm co-axial cables designed for digital audio or RF use. A.C. coupled cables are not suitable unless the Couple menu is set to Bipolar (see page **16**).

1394 Interface

The 1394 interface in not fitted in this release. It is intended for future enhancements.

Power Link

This can be linked to similar connectors on other ***dCS*** units using a link cable. All units linked in this way may be turned on or off or set to standby by pressing a single **Power** button or sending one Remote Control command. Link cables are available from ***dCS***.

SUC

The Software Upgrade Connector is intended to be used by ***dCS*** service agents to load new software into ***Verona***.

IMPORTANT!

*Do not connect any other equipment to the SUC connector as this may damage both **Verona** and the equipment so connected. Do not operate **Verona** with a PC connected. Failure to observe this warning will void the unit's warranty, and may cause unpleasant effects in your system.*

Power switch

The Power switch completely isolates the unit from the power supply. In normal use, set it to the On position (**I**). Set it to Off (**0**) during electrical storms, or while you are away for a long period.

IEC Power Inlet

Use with a 3 - pin IEC type power cable.

Mains Fuse

Replace only with a 20 x 5mm 500mA T HRC fuse. Please see page **34** for replacement details.

Additional Information

The rear panel displays the following information about the unit:

- The manufacturer's name and address.
- Supply voltage setting, frequency range and rated power.
- Model: ***dCS Verona***
- The short form of the unit serial number.

We will need the serial number (preferably the full serial number from the menu) to give you support over the phone, or to ship you software updates.

VERONA TECHNICAL INFORMATION

Digital Interface Specifications

Wordclock Outputs / Ext. Ref. Input	Ext Ref Input	Outputs	
Type	Single ended, ground referred		
Impedance	75	25	Ω
Level (unloaded)	TTL	TTL	
Connector	BNC	BNC x 5	

Table 1 –Wordclock Output / Ext Ref Input Electrical Characteristics

SPDIF	Outputs	
Type	Single ended, ground referred	
Impedance	75	Ω
Level (unloaded)	1.0	V pk-pk
Connector	RCA Phono x 3	

Table 2 – SPDIF Output Electrical Characteristics

Output Frequencies

44.1kHz or 48kHz on all Word Clock Outputs.
44.1kS/s or 48kS/s clock on all SPDIF Outputs.

Clocking

The sample clock quality significantly determines the output performance of the system. The highest quality clocks that are available are crystals, so we use these. ***Verona*** uses a pair of pre-aged, specially selected voltage controlled crystal oscillators (VCXO's) as clock sources. Each unit is individually calibrated over a wide temperature range for best accuracy.

When slaving to **Ext Ref In**, the VCXO is synchronised to the clock signal extracted from the input by a phase locked loop (PLL). This PLL is of a special narrow bandwidth type, that provides a significant degree of "clock cleaning". The PLL is also very robust, and will lock to very poor signals if necessary.

Accuracy	Typically ± 0.1 parts per million when shipped Better than ± 1 part per million within 12 months of shipping

Synchronising to Ext Ref In

The unit will slave to the following clock signals on the **Ext Ref In** connector:

- Word Clocks at 32, 44.1, 48, 88.2 or 96kHz (set the Couple menu to TTL).
- Reference clocks at 10MHz, such as those produced by GPS receivers or atomic clocks (set the Couple menu to Bipolar).

Pull-in range	± 300 parts per million about nominal frequency
Lock-in time	< 12 seconds for most situations

Power requirements

Units may be set for 100, 115/120, 200, 215/220 or 230/240V (+/-10%), 50/60Hz AC operation.

	Typical power consumption	Maximum power consumption
Purcell & ***Verona***	16W	20W
Delius	21W	25W
Elgar Plus	34W	40W
Verdi & ***La Scala***	25W	50W

Table 3 – Power consumption for consumer products

Size and Weight

	Length	Depth	Height	Weight
Purcell & ***Verona***	461mm (18.15”)	413mm (16.18”)	69mm (2.70”)	8.5kg (18.7lbs)
Delius	461mm (18.15”)	413mm (16.18”)*****	69mm (2.70”)	8.8kg (19.4lbs)
Elgar Plus	461mm (18.15”)	406mm (16.0”)	75mm (2.94”)	12.0kg (26.4lbs)
Verdi & ***La Scala***	461mm (18.15”)	415mm (16.34”)******	137mm (5.39”)	17kg (37.4lbs)

Table 4 – Size and weight for consumer products

- ****Delius*** only: the control knob protrudes out of the front by 20mm (0.79”).
- *****Verdi*** & ***La Scala*** only: the control knob protrudes out of the front by 13mm (0.51”).
- Allow extra depth for cable connectors.

Operating Conditions

- Ambient temperature range: 0°C (32°F) to 50°C (122°F), non-condensing.
- Do not install the unit near heat sources such as radiators, air ducts, power amplifiers or direct strong sunlight.
- If in doubt, the easy test is - ***Verona*** is happy to work anywhere a human is.

GENERAL TECHNICAL INFORMATION

Clock Dither

Phase Locked Loop (PLL) circuits are used in digital audio equipment to synchronise the local clock to the clock in the incoming data stream. PLL circuits tend to operate in the centre of a “dead band” when locked. In this band, the sensitivity of the loop to phase errors is reduced. This is somewhat similar to the cross-over region in a power amplifier.

The ***Verona*** can be set to add dither to the clock outputs, to keep the PLL active when it is locked. The dither takes the form of a small, random timing offset that is noise shaped, so that can be easily filtered out by the PLL. Unlike jitter, this offset is statistically well controlled, so that the effect averages out to zero.

Does a dithered clock make an audible difference? Turn it on and let your ears decide.

USING YOUR *dCS VERONA* FOR THE FIRST TIME

Thank you for purchasing this ***dCS Verona***. Before attempting to use your ***Verona***, please read at least the rest of this section and the "Step-by-Step Guide" on page **8.** This will enable you to set the unit up quickly with your hi-fi system.

What's in the Box?

The box should contain the following:

- ***dCS Verona***
- User Manual
- Control Summary
- Power Cable
- Spare Fuses (2)

Units supplied with a Remote Control (all models except ***Verona*** and ***Purcell***) should also be supplied with the following:

- Remote Control unit
- 3 x AAA batteries
- Pozidriv screwdriver (1 pt)

For safety reasons, the Remote Control is shipped with the batteries packed separately. For fitting details, see the "Maintenance and Support" section, starting on page **34**.

Units fitted with an IEEE 1394 interface[3] should also be supplied with the following:

- IEEE 1394 cable assembly
- BNC cable

Check the contents of the inner carton very carefully against the list above. Notify your dealer as soon as possible if anything is missing or damaged. ***dCS*** suggest that all of the original packaging is retained for use when transporting any units. Replacement packaging can be ordered from ***dCS*** or our distributors.

Safety Notice

Verona contains no user serviceable parts. Do not attempt to open the case as there are potentially dangerous voltages present inside. In the event of the unit developing a fault, please consult your dealer.

IMPORTANT! *This equipment MUST be connected to a safety earth (or ground) via the power cable.*

[3] The IEEE 1394 interface is an optional extra with ***Purcell*** or ***Delius*** units and is not yet available with ***Verona***.

Mains Voltage Setting

Before connecting the power cable to your ***Verona*** for the first time, please check that it has been set to the correct operating voltage for your local mains supply. 50Hz or 60Hz operation is not important – the unit can use either. The unit's present voltage setting is shown on the label beneath the mains inlet on the rear panel. If this does not match your local supply voltage, DO NOT attempt to use the unit. Contact your dealer to arrange to have the unit reset. Using the ***Verona*** with the wrong mains setting for your local supply may result in serious damage to the unit and will invalidate the warranty. DO NOT attempt to reset the unit yourself.

IMPORTANT! *Please use a sensible power cable, such as the one supplied with the unit. Some audiophile power cables presently available are excessively heavy, their weight can damage the power inlet connector. Such damage is not covered by the warranty.*

Positioning the Unit

Place ***Verona*** on a firm, vibration free base so as to allow convenient connection to your digital source. We suggest that you avoid siting ***Verona*** either directly above or below preamplifiers or tuners, if either of these will be used in your system at the same time as ***Verona***.

OPTIONS

The following options may be fitted to new units or retrofitted at a later date.

Option code	Option
V5	Mains voltage set to 230/240V
V4	Mains voltage set to 215/220V
V3	Mains voltage set to 200V
V2	Mains voltage set to 115/120V
V1	Mains voltage set to 100V

Table 5 – Options available

Mains Supply Voltage

Any unit may be set for operation from 230/240V, 215/220V, 200V, 115/120V or 100V A.C. Units are shipped set for the mains supply voltage according to the destination. The voltage setting can be updated later by your dealer, if necessary. Specify the new country of use or the new voltage setting.

Having Your Options Changed

dCS support modifications, updates and option changes to supplied units. Major changes are normally carried out at ***dCS,*** as we have extensive test facilities and can verify the changes. Please contact your dealer for details.

IMPORTANT! *Please do not attempt the changes yourself. The unit's performance or reliability may be impaired and the warranty will be invalidated.*

MAINTENANCE AND SUPPORT

Service & Maintenance

dCS audio products are designed not to need regular maintenance, and contain no user serviceable parts apart from the mains fuse.

If your unit is damaged in some way, please contact your dealer or ***dCS***.

Mains Fuse

There is a mains fuse below the power inlet, accessible from the outside of the unit. If the fuse blows, it may be changed by the user. The current consumption of the unit is very low, so it only blows if power surges occur, or there is a fault in the unit. Usually, power surges cause no other damage, but if the fuse blows repeatedly on replacement, some other damage will have been done and the unit must be returned to ***dCS*** for repair.

Fuse Type: 20 x 5mm 0.5 amp T HRC fuse

IMPORTANT! *If the fuse should fail, it is essential that it be replaced with one of the same type and rating. Failure to do so could result in damage to the unit, risk of fire or electric shock and will invalidate the guarantee.*

Replacing a Blown Fuse

Referring to **Figure 7**, remove the power cable, use a small flat bladed screwdriver to pry up the tab on the fuse carrier (A) and pull it out. Push the blown fuse out of the clip in the carrier (B) and dispose of it. Fit a new fuse in the clip (C) and push the carrier back into the unit so that it clicks home. Spare fuses are provided with the unit.

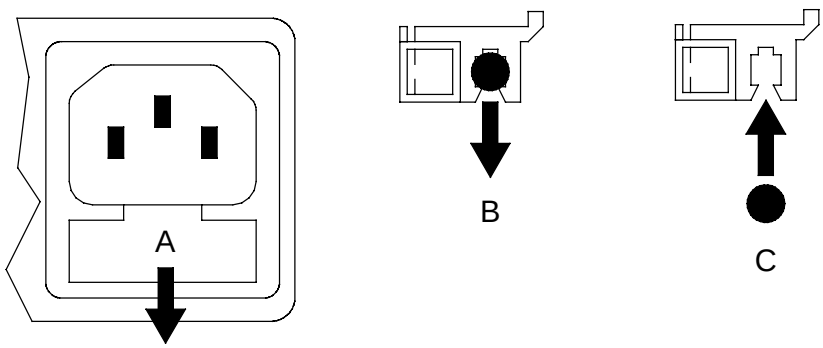

Figure 7 – Changing the Mains Fuse

IMPORTANT! *Disconnect the power cable before changing the fuse.*

dCS Limited Warranty

What This Warranty Covers

Provided the sale of this dCS product is registered with dCS within 30 days of the original purchase, this warranty covers parts and labour to correct any defects in materials or workmanship for a period of 1 year from the date of purchase. A copy of the original bill of sale may be required to verify the date of purchase.

IMPORTANT! *Registration is generally completed on your behalf by the authorised dCS reseller However it is your responsibility to ensure that the product is registered. If you do not receive a warranty certificate in the mail from dCS within 30 days of your purchase, contact dCS.*

Registration also ensures you will receive information on important hardware and software upgrades as they become available.

For products not registered with dCS, the 1 year warranty period commences on the date the product was originally shipped from the ***dCS*** factory.

If you sell this product within the warranty period, the balance of the warranty will remain in effect for subsequent owners.

What This Warranty Does Not Cover

This warranty does not cover products with missing or altered serial number, products originally purchased from other than an authorised ***dCS*** reseller, or problems that result from:

- External causes such as accident, abuse, misuse, or problems with electrical power.
- Unauthorised modifications.
- Use not in accordance with the operating conditions and instructions stated in the user manual.
- Service or repair by anyone other than an authorised ***dCS*** Distributor.
- Product operation on voltage outside a range of the voltage specified on the back panel, plus or minus 10%, or without a proper ground connection.
- Transport in inadequate packing.
- Problems caused by using accessories, parts, or components not supplied by ***dCS***.
- Master Clock accuracy is not guaranteed 12 months after shipping from ***dCS***.

This warranty does not cover carriage costs.

How To Obtain Service

Should you encounter a problem, please check the “Troubleshooting” section on page **38**. You may be able to resolve the situation yourself (for example, by changing a menu setting). If this does not resolve the problem, contact your authorised ***dCS*** reseller for advice, quoting the model, the full serial number, the software version and giving a detailed description of the fault. If you are unable to contact the reseller, you may contact ***dCS*** directly at:

dCS Ltd, Mull House, Great Chesterford Court
Great Chesterford, Saffron Walden, CB10 1PF UK

Phone: +44 (0)1799 531999 Fax: +44 (0)1799 531681
eMail: support@dcsltd.co.uk

Updating your *Verona*

dCS products make extensive use of software configurable chips – FPGAs and DSPs. This gives us the ability to update our products to add extra features, update digital interface standards or make performance improvements by loading new software. Occasionally, a hardware update may be necessary also to increase the "capacity" of the electronics, add extra connectors or extra front panel controls.

Software Updates

Please note that not all software updates make an earth-shattering change. You should have a clear idea of what you expect to gain before updating to the latest issue.

If the software loaded in your unit is (for example) version 3.45:

- A change to version 3.46 indicates a minor update for internal ***dCS*** use – to make testing easier, or more thorough, or to cater for some minor hardware change. Do not update your unit.
- A change to version 3.50 is a more serious update, offering extra functionality. If you want to use the extra features, update your unit. The manual will be updated for this (check the web-site).
- A change to version 4.00 is a major update. It will require updated hardware and the manual will be updated

If you have older hardware, some of the features added by new software may not be available due to (for example) a missing connector. For **recent** hardware, this is mentioned in the "Upgrader's notes" in this manual. If you need the missing feature, contact your dealer or ***dCS*** to arrange a hardware update.

- If the software currently loaded includes a CD Update page, you can update the software yourself. Contact ***dCS*** for a CD and follow the instructions in the CD Update section on page **18**, or the instructions supplied with the CD. The update program will check your hardware configuration and install the latest software compatible with it.
- If you do not have the CD Update feature loaded or have difficulty with it, a ***dCS*** distributor can download files from a PC into any unit fitted with a **SUC** connector. Contact your dealer for details.
- For older units without a **SUC** connector, your distributor can install new firmware in your unit. Firmware updates are low-cost from ***dCS*.** Contact your dealer for details.

Hardware Updates

You may wish to have your hardware updated from time to time to take advantage of new features in the latest software. ***dCS*** offer this service - we will retest, reset any adjustable items to current shipping standards, and install any modifications or updates that have occurred since your unit was first shipped.

The price will depend on the hardware changes necessary – please contact your dealer or ***dCS*** for details and pricing. In order to ensure speedy turn around, please contact us prior to returning the unit to get a **Service Return** number.

Safety and Electrical Safety

There are no user serviceable parts inside ***Verona*** and so there is no need to remove the covers. If for some reason you do:

IMPORTANT! *Disconnect the power cable before removing any covers or changing the fuse.*

There are no substances hazardous to health inside ***Verona***.

Cleaning the Case

Do not apply any of the following cleaning products to the case as they will damage or alter the finish:

- Corrosive or abrasive agents
- Spirit or alcohol based cleaners
- Wax polish

do this: To remove dust, wipe with a moist, soft cloth.

do this: To remove deposits from the case, first disconnect the power cable then spray very lightly with a proprietary glass cleaner containing ammonia and wipe off gently with a soft cloth, taking care to avoid scratches. Do not spray the cleaner onto the connectors or the rear panel.

TROUBLESHOOTING

Fault Indication

Verona detects the following fault conditions:

Power interruption

If the AC supply is momentarily interrupted or is more than 20% below it's rated voltage, the unit displays **PowerDn** and mutes the audio outputs to protect your loudspeakers from damage. This may be caused by loose AC power wiring, local power-line overloads or heavy-duty appliances like air conditioners. If this message appears frequently (other than when switching the unit off), please consult your dealer.

Power up test errors

If ***Verona*** detects a fault during its power up test routine, it will remain muted and display one of these messages:

- **DSPs Not Loaded (#01)**
- **FPGAs Not loaded (#02)**
- **Bad Checksum. Press any key to attempt recovery (#03)**
- **DSP-Err1 (#04)**

This can be caused by power line transients occurring during system configuration. For **Bad Checksum**, press any button to try to clear the fault. Otherwise, try switching off, waiting 20 seconds, then switching on again. If the fault persists, please consult your dealer.

Troubleshooting Guide

If you experience difficulties when using your ***Verona***, the following suggestions may help resolve the problem.

IMPORTANT! ***The GOLDEN RULES for using a Master Clock*:**

- The source equipment **MUST** be locked to the Master Clock.
- The **Clock Frequency** **MUST** match the sample rate(s) used in the system.

The unit fails to power up

- Ensure there is power available on the mains cable. Connect the power cable, ensure it is pushed all the way in and press the **Power** button. If there is a Power switch on the back panel, ensure this is set to the On (**I**) position.
- Check the rated supply voltage shown on the rear of the unit matches the local supply voltage.
- Check that the fuse has not blown - if so, correct any obvious cause then replace the fuse as described on page **34**.

The DAC/DDC suddenly mutes, *Verona* repeats its' power-up sequence

- This may be caused by short drop-outs or brown-outs on the AC supply. When the disturbance has passed, normal operation should be restored.
- Check for loose mains wiring.

The system fails to lock to *Verona*

- Check that the digital audio cables are of the correct type, correctly connected and not damaged. Damaged cables are a VERY common cause of malfunctions!
- Check that ***Verona*** is switched on and has settled for at least 1 minute.
- Check that ***Verona*** is set to the correct **Clock Frequency** (probably **44.1kHz**).
- ***dCS Verdi*** and ***La Scala*** will only accept a 44.1kHz clock.
- ***dCS Purcell*** will only lock if the WClk page is set to WClk:In.
- ***dCS Elgar Plus*** and ***Delius*** will only lock if the MS page is set to MS:Sync.
- If you are using ***dCS Elgar Plus*** or ***Delius*** with ***Verona*** while upsampling to 176.4 or 192kS/s Dual AES or 88.2 or 96kS/s Single AES, you will need software v4.30 or later for ***Elgar Plus*** or v2.30 or later for ***Delius***.
- If ***Verona*** is locked to an **Ext**ernal **Ref**erence, ensure the reference frequency is at a suitable frequency and the Couple menu is set to match the external reference.
- If ***Verona*** is trying to lock to an **Ext**ernal **Ref**erence but is continuously displaying **Locking**, there is something wrong with the external reference generator, the menu settings or the cable. The external reference may be out of calibration, or at a frequency that the ***Verona*** cannot lock to.
- AC coupled cables are not suitable for use with Word Clock signals.

Periodic clicks are heard from the loudspeakers

- This is often caused by part of the system (usually the source equipment) not being locked to the ***Verona***, while the DAC is locked. Check that the system is connected correctly, that the menu settings are correct and the master clock frequency matches the sample rates in use.

The Display turns on briefly when a control is operated, then turns off

- This happens when the display brightness is set to Bright 0. Open the Menu and change Bright to a different setting.

Menu Timeout does not work

- Page through the menu to the TimeOut page and check the setting. If you want to set TimeOut to None, you must close the menu by selecting the End page.
- Someone has turned the menu timeout off, using remote software running on a PC. Open the Menu and run the Factory routine to reset everything to ex-factory settings.

IF YOU NEED MORE HELP

In the first instance, you should contact your dealer. If they cannot resolve the issue, contact ***dCS***. Our office hours are 8:30 a.m. to 5:00 p.m. Monday to Friday, UK time (GMT in Winter or GMT + 1hr in Summer). Contact us by phone or fax on:

	Inside the UK	Outside the UK
Telephone	01799 531 999	+44 1799 531 999
Fax	01799 531 681	+44 1799 531 681

Table 6 – ***dCS*** Contact Information

You can write to us at:

dCS Ltd
Mull House
Great Chesterford Court
Great Chesterford
Saffron Walden CB10 1PF
UK

Our email address: support@dcsltd.co.uk

Our web-site is: www.dcsltd.co.uk

The web-site is regularly updated. You will find full details of all ***dCS*** products here, plus the latest ***dCS*** news.

Other Information

dCS produce technical notes from time to time, on issues related to ADCs, DACs and DDCs. If you are interested in these, please check our web-site.

INDEXES AND SOFTWARE VERSION NUMBERS

Software History

This manual is for ***Verona*** software version 1.1x.

IMPORTANT! *Updating to v1.1x from v1.0x is normally carried out by **dCS** Distributors, as it is necessary to install a license into the unit after updating to restore normal operation.*

Version 1.1x adds a software licensing feature but otherwise is functionally identical to v1.0x.

Definitions and Abbreviations

ADC	Analogue to Digital Converter, sometimes referred to as an A/D Converter.
AES3	A standard professional stereo digital audio format consisting of one serial PCM data line. It uses a balanced cable to extend transmission distance and includes a comprehensive messaging system.
DAC	Digital to Analogue Converter, sometimes referred to as a D/A Converter.
dB	A relative signal level or ratio in decibels. The context may indicate the reference level.
dB0	Level in decibels, referred to a full scale sine wave in a sampled system. So, 0dB0 is full scale.
dBu	A signal level relative to 0.775V rms, making no allowance for external loading.
DDC	Digital to Digital Converter, sometimes referred to as a D/D Converter.
DSD	Direct Stream Digital - a single bit digital audio format, sampled at 2.822MS/s.
kS/s	Sample rate in kilo-samples per second. This replaces kHz, which is technically incorrect when referring to sample rates.
SDIF-2	Sony Digital InterFace – a stereo digital audio format consisting of 2 serial PCM or DSD data lines. Usually used with a Word Clock.
SPDIF	Sony / Philips Digital InterFace – a stereo digital audio format for consumer equipment, consisting of one serial PCM data line. Similar to AES3, but unbalanced and with different messaging.
Word Clock	A synchronisation signal consisting of a square-wave, the frequency of which is the sample rate. Usually transmitted through co-axial cable and BNC connectors.

Key to Cable Identification

If you are reading a colour print or a soft copy of this manual, cable types shown in figures can be identified from **Table 7**.

Cable Type	Colour / Style
XLR Analogue	Brown, solid
RCA Phono Analogue	Brown, long dash
XLR Digital (AES3)	Blue, solid
BNC Digital	Pale blue, solid
RCA Phono Digital (SPDIF)	Pale blue, short dash
Optical (SPDIF)	Dark magenta, solid
IEEE 1394	Red, solid
Sync Link	Green, solid
Wordclock	Dark green, solid
AES Reference	Dark green, long dash
GPS Reference	Dark green, short dash
RS-232	Purple, solid

Table 7 – Cable colours and styles

Where more than one cable of any type is used in a drawing, they can be identified by a coloured sleeve at the source and a coloured arrow head at the destination.

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